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--99. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said second type comprise at least two pairs of generally opposing reentrant slots.--

By
--100. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein said first type length of said reentrant slots of said first type is substantially the same.--

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--101. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein said second type length of said reentrant slots of said second type is substantially the same.--

--102. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said first type define reentrant portions having an elongated shape.--

--103. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein said reentrant slots of said second type define reentrant portions having a pear-shape.--

--104. (New) The early suppression fast response fire protection sprinkler of claim 93, wherein a reentrant slot of said second type is located between reentrant slots of said first type.--

REMARKS

Applicants acknowledge indication by he Examiner that claims 2-20 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 2 is accordingly rewritten in independent form including all of the limitations of one base claim (claim 1), and new claims 36, 37, and 38 are introduced, each incorporating all of the limitations of claim 2 and including all of the limitation of another of the base claims, i.e., claims 22, 23, or 24, respectively. The remaining dependent claims (claims 3-20) are also amended to depend from each of claims 2, 36, 37, and 38. We submit that claims 2-20 and 36-38 are all now in condition for allowance.

In addition, new independent claims 39-42 are introduced. These claims correspond to claims 21 and 25-27, respectively, and each new claim incorporates all of the limitations of claim 2 and includes all of the limitations of claim 21, 25, 26, or 27, respectively. New dependent claims 43-60, corresponding to claims 3-20, respectively, and depending from claim 21, 25, 26,

or 27, are also introduced. We submit that each of claims 39-60 is also in condition for allowance on the same basis as claims 2-20 and 36-38, discussed above.

New independent claims 61-64 are also introduced. These new claims correspond to claims 28-31, respectively, and each new claim incorporates all of the limitations of claim 2 and includes all of the limitations of claim 28, 29, 30, or 31, respectively. New dependent claims 65-82, corresponding to claims 3-20, respectively, and depending from claim 61, 62, 63, or 64, are also introduced. We submit that each of claims 61-82 is also in condition for allowance on the same basis as claims 2-20 and 36-38, discussed above.

Finally, new independent claims 83-86 are also introduced. These new claims correspond to claims 32-35, respectively, and each new claim incorporates all of the limitations of claim 2 and includes all of the limitations of claim 32, 33, 34, or 35, respectively. New dependent claims 87-104, corresponding to claims 3-20, respectively, and depending from claim 83, 84, 85, or 86, are also introduced. We submit that each of claims 83-104 is also in condition for allowance on the same basis as claims 2-20 and 36-38, discussed above.

Turning now to the remaining issues, claims 1, 21, 28 and 32 are rejected under 35 USC §102(b) as being anticipated by Ponte U.S. 5,915,479, and claims 22-27, 29-31, and 33-35 are rejected under 35 USC §103(a) as being obvious and therefore unpatentable over Ponte '479. We respectfully traverse.

Applicants' invention is an early suppression fast response (ESFR) fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231, and NFPA 231C. Copies of these standards, the complete disclosures of which are incorporated into this application by reference (page 22, lines 15-17), have been provided to the examiner. As explained in the specification, beginning at page 2, line 19, "ESFR" or "Early Suppression Fast Response" defines a specific type of fire protection sprinkler, i.e., a fire protection sprinkler that meets the specific UL Listing and FM Approval Standards required to earn this label (see page 4, lines 5-6 of the specification). Enclosed in this regard are Technical Data Sheets for the Grinnell Corporation Model ESFR-25™ sprinkler (Exhibits A and B), which is the commercial embodiment of this invention (see page 20, line 5 to page 23, line 10 of the specification).

In contrast, the fire protection sprinkler described in Ponte '479 is not an ESFR sprinkler, but rather, it is a "VELO" or "Very Extra Large Orifice" sprinkler (column 3, line 52), which is

designed to different requirements. In fact, the commercial embodiment of the Ponte '479 invention is represented by the Reliable Model G VELO PEND sprinkler, which is marked with the Ponte '479 patent number (see photographs in Exhibit C), and Product Bulletins for the Reliable Model G VELO PEND sprinkler (Exhibits D and E) specifically caution, at page 2, under "Design Conditions," that:

The Model G VELO is not a "Large Drop" or "ESFR" sprinkler.

The substantial differences between an ESFR fire protection sprinkler and a VELO fire protection sprinkler are very clearly defined to those skilled in the art. For example, in the 1996 Edition of NFPA13 Standard for the Installation of Sprinkler Systems, at Section 1-4.5.2, an ESFR sprinkler is defined as a specific type of fire protection sprinkler, and at Section 5-3.5.4, it is stated that an ESFR sprinkler system must be hydraulically designed for a minimum of the hydraulically most demanding 12 sprinklers operating over a minimum of 960 sq. ft. This is in sharp contrast to the requirements for a VELO or so-called "area/density application-type sprinkler" represented by Ponte '479, for which the hydraulic design area of sprinkler operation varies with the type of hazard being protected (e.g., minimum 2,500 sq. ft. of hydraulically most demanding area sprinkler operation at a density of 0.40 gallon per minute per sq. ft. for an Extra Hazard Group 2 Occupancy). Also, in the 1998 Edition of NFPA 231C Standard for General Storage, the complex sprinkler system design requirements for a VELO or area/density type of sprinkler represented by Ponte '479 are found at Chapters 6, 7 and 8, while the highly simplified installation rules for an ESFR type sprinkler are described at Chapter 10. Finally, by way of an illustrative comparison based on the 1998 Edition of NFPA 231C, at Section 8-2.1.3, the VELO or area density application-type sprinkler represented by Ponte '479 would require design for a minimum 4,000 sq. ft. of the hydraulically most demanding area of sprinkler operation, at a density of 0.60 gallon per minute per sq. ft. for protection of Single-Row and Double-Row Rack Storage of cartoned, expanded, Group A plastics (see FIG. 8-2.1(D)), resulting in a minimum total flow of 2,400 gallons per minute, for the case of a ceiling-only sprinkler system. In contrast, an ESFR sprinkler system would require design for a minimum of the hydraulically most demanding 12 sprinklers (see Section 10-2.1 and Table 10-1.1), with a minimum total flow volume of only 1,200 gallons per minute.

We submit, therefore, that Ponte '479 fails to teach, or to suggest, Applicants' invention of an ESFR, or Early Suppression Fast Response, fire protection sprinkler capable of operating at the lower design pressures, as now more clearly claimed.

Furthermore, in fire tests described in the "Fire Test Data Summary" (dated September 30, 1998) prepared by Underwriters Laboratories Inc. for Grinnell Corporation (a copy of which was provided to the Examiner with the response to the Office action mailed February 11, 2000), the superior performance of the Grinnell Corporation Model ESFR-25™ pendent sprinkler resulted in a UL Listing of the Model ESFR-25™ pendent sprinkler for use at the minimum design flowing pressures of about 15 to 40 psi (depending on prescribed storage conditions), as claimed, which was well below the NFPA Standard minimum design flowing pressures of 50 to 90 psi (at these same prescribed storage conditions), required prior to Applicants' invention, as found in Table 10-1.1 of the 1998 Edition of NFPA 231C (effective date of August 5, 1998)). The UL Listing of the Grinnell Corporation Model ESFR-25™ pendent sprinkler is also at minimum design flowing pressures below the subsequent 20 to 50 psi FM Approved minimum design flowing pressures (also at these same prescribed storage conditions) for the Central Sprinkler Company Model 25K ESFR pendent sprinkler, described in the Central Sprinkler Data Sheet No. 3-1.0, dated 01/98 (Exhibit F). There is no teaching or suggestion in Ponte '479 for Applicants' invention of an ESFR fire protection sprinkler capable of operating at these markedly reduced minimum ESFR sprinkler design pressures.¹

¹ The Central Sprinkler Company Model 25K ESFR pendent sprinkler is the commercial embodiment of Meyer et al. U.S. 5,829,532, which is already of record in this application. Meyer et al. '532, while describing an ESFR fire protection sprinkler of construction different from the sprinkler of the present invention, mentions that:

Applicants believe that water might similarly be supplied at flow pressures of at least 15 psig to successfully suppress such fires. (column 8, lines 26-29)

However, there is no disclosure in Meyer et al. '532 of the described ESFR fire protection sprinkler operating at the minimum design flowing pressures claimed, and demonstrated, by Applicants. Therefore, Applicant's invention is not taught by Meyer et al. under 35 USC §102 (see In re Epstein, 32 F.3d 1559 (Fed.Cir. 1994)), nor is Applicant's invention fairly suggested by Meyer et al. under 35 USC §103 (see Rockwell International Corp. v. U.S., 147 F.3d 1358 (Fed.Cir. 1998)).

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Applicants submit that this application is now in condition for allowance. Early favorable action is solicited. Filed herewith is a check for \$5,622.00 in payment of the fee for additional claims fees required by the above amendments. Please apply any other charges, or make any credits, to Deposit Account No. 06-1050.

Respectfully submitted,

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